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(I26-0027)

REMARKS

Claims 1-23 were pending in the present application. Claims 1 and 23 have been amended, and Claims 2 and 16 have been canceled, leaving Claims 1, 3-15, and 17-23 for further consideration in the present amendment.

The basis of support for amended Claim 1 can be found throughout Applicants' specification and examples. Claim 23 was amended to correct for antecedent basis, inserting "a" before fluorine-containing dielectric wire structure in the preamble. Claim 23 was also amended to clarify the claim term nitrogen gas, support of which can be found on page 6, the first full sentence. No new matter has been introduced by these amendments.

Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Claim Rejections Under 35 U.S.C. § 102(b)

Claims 1 and 8-14 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by U.S. Patent No. 5,930,655 to Cooney, III et al. (hereinafter "Cooney"). Applicants respectfully traverse.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988).

Cooney fails to disclose a process that consists essentially of, *inter alia*, generating a plasma containing atomic hydrogen species and exposing the fluorine-containing dielectric to the atomic hydrogen species. As noted by the Examiner, Cooney discloses that a plasma may be induced during an annealing step, "to form the fluorine free barrier layer in this manner, the fluorine-containing insulator material can be annealed in hydrogen gas with or without plasma, or alternatively, can be exposed to a plasma of oxygen or ozone, to deplete and cause elimination of fluorine from the surfaces of a fluorine containing insulator material to create a fluorine free layer in the surface regions of the insulator material." (see Cooney, Col. 2, ll. 58-62). As such, Cooney teaches annealing and plasma in the presence of hydrogen gas or a process that consists of plasma

exposure formed from oxygen or ozone. There is no disclosure of a process that consists essentially of generating a plasma containing atomic hydrogen species and exposing the fluorine-containing dielectric to the atomic hydrogen species as claimed by Applicants.

Accordingly, the rejection applied to Claim 1 and 8-14 should be withdrawn for at least this reason.

Claim Rejection under 35 U.S.C. § 102(e)

Claim 23 stands rejected as being anticipated by U.S. Patent No. 6,433,432 B2 to Shimizu (hereinafter "Shimizu"). Applicants respectfully traverse.

Shimizu fails to anticipate Claim 23 because Shimizu fails to disclose or suggest a process, consisting essentially of, *inter alia*, generating atomic nitrogen species from nitrogen gas or a mixture containing the nitrogen gas; and exposing the fluorine-containing dielectric to the atomic nitrogen species in an amount effective to lower the fluorine content in the fluorine-containing dielectric. There is not disclosure of, *inter alia*, generating atomic nitrogen species from nitrogen gas or a mixture containing the nitrogen gas. Shimizu discloses exposing the surface of a copper film to ammonia (NH_3) plasma. The disclosure of an ammonia plasma does not anticipate a nitrogen gas (N_2).

Accordingly, Shimizu fails to anticipate Claim 23 and the rejection is requested to be withdrawn.

First Claim Rejection Under 35 U.S.C. § 103(a)

Claims 2-7 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Cooney. Applicants respectfully traverse.

Claims 2-7 depend from independent Claim 1 that was discussed above.

A *prima facie* of obviousness has not been established because Cooney fails to teach or suggest, a process that consists essentially of, *inter alia*, process that consists essentially of generating a plasma containing atomic hydrogen species and exposing the fluorine-containing

dielectric to the atomic hydrogen species as claimed by Applicants. As previously discussed, the only process taught or suggested by Cooney that consists essentially of exposing the fluorine containing dielectric to a plasma is one formed of oxygen or ozone. There is no teaching or suggestion of a process that consists essentially of generating a plasma containing atomic hydrogen species and exposing the fluorine-containing dielectric to the atomic hydrogen species.

Accordingly, the rejection is requested to be withdrawn for at least this reason.

Second Claim Rejection Under 35 U.S.C. § 103(a)

Claims 15-22 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Shimizu in view of U.S. Patent Application Publication No. 2002/0063312 A1 to Towle et al. (hereinafter "Towle"). Applicants respectfully traverse.

Applicants first traverse that a *prima facie* case has not been established because Shimizu in view of Towle fails to teach or suggest, *inter alia*, forming a gap in a layer of the fluorine-containing dielectric; overfilling the gap with the copper metal conductor; planarizing and removing the copper metal above the fluorine-containing dielectric to expose a surface of the fluorine-containing dielectric; forming a plasma from a hydrogen bearing gas to generate atomic hydrogen species, wherein the hydrogen bearing gas comprises a hydrocarbon, a hydrofluorocarbon, a hydrogen gas, ammonia, a water vapor, or mixtures comprising at least one of the foregoing hydrogen bearing compounds; exposing the surface of the fluorine-containing dielectric to the atomic hydrogen species and removing fluorine from and about the surface of the fluorine-containing dielectric.

The process disclosed by Shimizu for reducing fluorine includes, *inter alia*, cleaning the copper wire, etching the copper wire by argon sputter and then exposing the copper wiring to ammonia plasma. There is no disclosure or suggestion of forming a plasma from a hydrogen bearing gas to generate atomic hydrogen species, wherein the hydrogen bearing gas comprises a hydrocarbon, a hydrofluorocarbon, a hydrogen gas, ammonia, a water vapor, or mixtures comprising at least one of the foregoing hydrogen bearing compounds as claimed by Applicants. Also, it is noted that Shimizu further teaches and suggests the use of a barrier layer, specifically the use of tantalum nitride (see Shimizu, Col. 4, ll. 40-65).

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Towle fails to compensate for the deficiencies of Shimizu because Towle teaches a process, *inter alia*, forming the dielectric with reduced fluorine content prior to metallization (see Towle, Paragraphs [0040] and [0041]. By processing the fluorine containing dielectric in this manner, the reduction in fluorine undesirably decreases the dielectric constant at the interface between the insulator and the metal conductor. Moreover, Towle also teaches and suggests the use of a barrier layer (see Towle, paragraph [0031]). Applicants have developed a process consists essentially of the featured steps, which do not include depositing a barrier layer.

Accordingly, the cited references, individually or in combination, fail to establish a prima facie case of obviousness for at least these reasons. Applicants respectfully request withdrawal of rejections to Claims 15-22.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 09-0458.

Respectfully submitted,

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